

FORM PTO-1390 (Modified)
(REV. 11-95)

U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

ATTORNEY'S DOCKET NUMBER

TRANSMITTAL LETTER TO THE UNITED STATES

RBL0081

DESIGNATED/ELECTED OFFICE (DO/EO/US)

U.S. APPLICATION NO. (IF KNOWN, SEE 37 CFR

CONCERNING A FILING UNDER 35 U.S.C. 371

09/936273

INTERNATIONAL APPLICATION NO.

INTERNATIONAL FILING DATE

PRIORITY DATE CLAIMED

PCT/DE00/00751

13 March 2000

12 March 1999

TITLE OF INVENTION

METHOD FOR ADAPTING THE MODE OF OPERATION OF A MULTI-MODE CODE TO THE CHANGING
CONDITIONS OF RADIO TRANSFER IN A CDMA MOBILE RADIO NETWORK

APPLICANT(S) FOR DO/EO/US

Rene Bemmer et al.

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☐ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☒ This is an express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39(1).
4. ☒ A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.
5. ☒ A copy of the International Application as filed (35 U.S.C. 371 (c) (2))
 - a. ☒ is transmitted herewith (required only if not transmitted by the International Bureau).
 - b. ☐ has been transmitted by the International Bureau.
 - c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).
6. ☒ A translation of the International Application into English (35 U.S.C. 371(c)(2)).
7. ☒ A copy of the International Search Report (PCT/ISA/210).
8. ☐ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371 (c)(3))
 - a. ☐ are transmitted herewith (required only if not transmitted by the International Bureau).
 - b. ☐ have been transmitted by the International Bureau.
 - c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
 - d. ☐ have not been made and will not be made.
9. ☐ A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
10. ☒ An oath or declaration of the inventor(s) (35 U.S.C. 371 (c)(4)).
11. ☒ A copy of the International Preliminary Examination Report (PCT/IPEA/409).
12. ☒ A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371 (c)(5)).

Items 13 to 20 below concern document(s) or information included:

13. ☒ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
14. ☐ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
15. ☒ A **FIRST** preliminary amendment.
16. ☐ A **SECOND** or **SUBSEQUENT** preliminary amendment.
17. ☐ A substitute specification.
18. ☐ A change of power of attorney and/or address letter.
19. ☒ Certificate of Mailing by Express Mail
20. ☒ Other items or information:

Check No. 100686

U.S. APPLICATION NO. (IF KNOWN, SEE 37 CFR 1.53) 09/936273		INTERNATIONAL APPLICATION NO. PCT/DE00/00751		ATTORNEY'S DOCKET NUMBER RBL0081	
--	--	--	--	--	--

21. The following fees are submitted: BASIC NATIONAL FEE (37 CFR 1.492 (a) (1) - (5)) : <input type="checkbox"/> Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO \$1,000.00 <input checked="" type="checkbox"/> International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO \$860.00 <input type="checkbox"/> International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO \$710.00 <input type="checkbox"/> International preliminary examination fee paid to USPTO (37 CFR 1.482) but all claims did not satisfy provisions of PCT Article 33(1)-(4) \$690.00 <input type="checkbox"/> International preliminary examination fee paid to USPTO (37 CFR 1.482) and all claims satisfied provisions of PCT Article 33(1)-(4) \$100.00				CALCULATIONS PTO USE ONLY	
ENTER APPROPRIATE BASIC FEE AMOUNT =				\$860.00	
Surcharge of \$130.00 for furnishing the oath or declaration later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492 (e)).				\$0.00	
CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE		
Total claims	20 - 20 =	0	x \$18.00	\$0.00	
Independent claims	1 - 3 =	0	x \$80.00	\$0.00	
Multiple Dependent Claims (check if applicable). <input type="checkbox"/>				\$0.00	
TOTAL OF ABOVE CALCULATIONS =				\$860.00	
Reduction of 1/2 for filing by small entity, if applicable. Verified Small Entity Statement must also be filed (Note 37 CFR 1.9, 1.27, 1.28) (check if applicable). <input type="checkbox"/>				\$0.00	
SUBTOTAL =				\$860.00	
Processing fee of \$130.00 for furnishing the English translation later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492 (f)).				\$0.00	
TOTAL NATIONAL FEE =				\$860.00	
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31) (check if applicable). <input type="checkbox"/>				\$0.00	
TOTAL FEES ENCLOSED =				\$860.00	
				Amount to be: refunded	\$
				charged	\$

☒ A check in the amount of **\$860.00** to cover the above fees is enclosed.
☐ Please charge my Deposit Account No. _____ in the amount of _____ to cover the above fees.
 A duplicate copy of this sheet is enclosed.
☒ The Commissioner is hereby authorized to charge any fees which may be required, or credit any overpayment to Deposit Account No. **02-0385** A duplicate copy of this sheet is enclosed.

NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.

SEND ALL CORRESPONDENCE TO:

John F. Hoffman
BAKER & DANIELS
 111 East Wayne Street, Suite 800
 Fort Wayne, IN 46802

TX: (219) 424-8000
FAX: (219) 460-1700

SIGNATURE

JOHN F. HOFFMAN

NAME

26,280

REGISTRATION NUMBER

SEPTEMBER 10, 2001

DATE

10 SEP 2001

3/2 rds

(43) Date of international publication Sept. 21, 2000

(10) Number of international publication WO 00/56001 A1

(31) International patent classification H04L 1/00

(21) International file ID PCT /DE00/00751

(22) Date of international application March 13, 2000

(25) Language of application German

(26) Language of publication German

(30) Priority data 199 11 179 0 March 12, 1999 DE

(71) Applicant (for all member countries except USA)
DETEMOBIL DEUTSCHE TELEKOM MOBILNET GMBH (DE/DE);
Landgrabenweg 151, D-53227 Bonn (DE).

(72) Inventor and

(73) Inventor/applicant (only for USA): Demmer, René (DE/DE), Klufterstrasse 8, D 53175 Bonn (DE); LIU, Zhongrong (DE/DE), Rilkestrasse 83, D 53225 Bonn (DE).

(74) Attorney: RIEBLING, Peter, PO Box 3160, 88113 Lindau (DE).

[(54) Title and (57) Abstract are in English, not reproduced here]

I, Klaus Alt, certify hereby that the attached 26 pages are a complete and true translation of the patent documentation and associated materials under International Publication Number PCT WO 00/50001 AI to the best of my knowledge and belief. I am an experienced translator accredited by the American Translators Association for translation from German to English and from English to German. My ATA membership number is 5684.

Klaus Alt
Klaus Alt

Date 8-31-2001

INVENTOR INFORMATION

09/936273

JG03 R&D PATENT 10 SEP 2001

Inventor One Given Name:: Rene
Family Name:: Bemmer
Postal Address Line One:: Klufterstrasse 8
City:: Bonn
Country:: Germany
Postal or Zip Code:: D-53175
City of Residence:: Bonn
Country of Residence:: Germany
Citizenship Country:: Germany
Inventor Two Given Name:: Zhongrong
Family Name:: Liu
Postal Address Line One:: Rilkestrasse 83
City:: Bonn
Country:: Germany
Postal or Zip Code:: D-53225
City of Residence:: Bonn
Country of Residence:: Germany
Citizenship Country:: Germany

CORRESPONDENCE INFORMATION

Correspondence Customer Number:: 000832
Fax One:: 219-460-1700
Electronic Mail One:: jfhoffma@bakerd.com

APPLICATION INFORMATION

Title Line One:: METHOD FOR ADAPTING THE MODE OF OPERATION
Title Line Two:: N OF A MULTI-MODE CODE TO THE CHANGING C
Title Line Three:: CONDITIONS OF RADIO TRANSFER IN A CDMA MO
Title Line Four:: BILE RADIO NETWORK
Total Drawing Sheets:: 3
Formal Drawings?:: Yes
Application Type:: Utility
Docket Number:: RBL0081
Secrecy Order in Parent Appl.?:: No

REPRESENTATIVE INFORMATION

Representative Customer Number:: 832
Registration Number One:: 26280
Registration Number Two:: 24871
Registration Number Three:: 40181
Registration Number Four:: 32816
Registration Number Five:: 44326
Registration Number Six:: 46644
Registration Number Seven:: 48230

JCO3 Rec'd 10 SEP 2001

10 SEP 2001

Registration Number Eight:: 48238
Registration Number Nine:: 48358
Registration Number Ten:: 48696
Registration Number Eleven:: 33687
Registration Number Twelve:: 18778
Registration Number Thirteen:: 32230
Registration Number Fourteen:: 39679
Registration Number Fifteen:: 32722
Registration Number Sixteen:: 37370
Registration Number Seventeen:: 41358
Registration Number Eightteen:: 45547
Registration Number Nineteen:: 44403
Registration Number Twenty:: 46791
Registration Number Twenty-One:: 47116
Registration Number Twenty-Two:: 47679

PRIOR FOREIGN APPLICATIONS

Foreign Application One:: 199 11 179.0
Filing Date:: 03-12-1999
Country:: Germany
Priority Claimed:: Yes
Foreign Application Two:: PCT/DE00/00751
Filing Date:: 03-13-2000
Country:: WO
Priority Claimed:: Yes

Source:: PrintEFS Version 1.0.1

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of)
 René Bemmer et al.)
 Serial No.) Group:
 Filed:)
 Title: METHOD FOR ADAPTING THE MODE) Examiner:
 OF OPERATION OF A MULTI-MODE)
 CODE TO THE CHANGING)
 CONDITIONS OF RADIO TRANSFER)
 IN A CDMA MOBILE RADIO NETWORK)

PRELIMINARY AMENDMENT DELETING MULTIPLE DEPENDENT CLAIMS

Assistant Commissioner of Patents
 Washington, DC 20231

Sir:

Prior to calculating the filing fee, please enter the following amendments to the application.

IN THE CLAIMS

In claim 4, line 1, delete "one of Claims 1 to 3" and substitute therefor --claim 1--.

In claim 5, line 1, delete "one of Claims 1 to 4" and substitute therefor --claim 1--.

In claim 6, line 1, delete "one of Claims 1 to 5" and substitute therefor --claim 1--.

In claim 7, line 1, delete "one of Claims 1 to 6" and substitute therefor --claim 1--.

In claim 8, line 1, delete "one of Claims 1 to 7" and substitute therefor --claim 1--.

In claim 9, line 1, delete "one of Claims 1 to 8" and substitute therefor --claim 1--.

In claim 10, line 1, delete "one of Claims 1 to 9" and substitute therefor

--claim 1--.

In claim 11, line 1, delete "one of Claims 1 to 10" and substitute therefor

--claim 1--.

In claim 12, line 1, delete "one of Claim 1 to 11" and substitute therefor

--claim 1--.

In claim 13, line 1, delete "one of Claims 11 or 12" and substitute therefor

--claim 11--.

In claim 14, line 1, delete "one of Claims 1 to 13" and substitute therefor

--claim 1--.

Please add the following new claims:

--15. Procedure according to claim 2, characterized by having the decision to change the codec operating mode originate in the radio network controllers RNC (3) of the mobile transmission network.

16. Procedure according to claim 3, characterized by having the decision to change the codec operating mode originate in the radio network controllers RNC (3) of the mobile transmission network.

03/936273-11000

17. Procedure according to claim 2, characterized by having the radio network controllers RNC (3) select the physical transmission channel to be used when there is a change of the codec operating mode.

18. Procedure according to claim 3, characterized by having the radio network controllers RNC (3) select the physical transmission channel to be used when there is a change of the codec operating mode.

19. Procedure according to claim 4, characterized by having the radio network controllers RNC (3) select the physical transmission channel to be used when there is a change of the codec operating mode.

20. Procedure according to claim 2, characterized by having the base stations Node-Bs (4) inform the radio network controller RNC (3) regarding the quality of the connection in the uplink, and where the mobile stations MS (6), using Node-Bs (4) of the radio network controller RNC (3), decides on a change of codec operating modes based on the measurement values.--

Respectfully submitted,

John F. Hoffman
Registration No.26,280

Attorney for Applicant

JFH/pmp

BAKER & DANIELS
111 East Wayne Street, Suite 800
Fort Wayne, IN 46802

Date: September 10, 2001

Method for Adapting the Mode of Operation of a Multi-Mode Codecs to the Changing Conditions of Radio Transmission in a CDMA Mobile Radio Network.

(0001) The invention concerns a method for adapting the mode of operation of a multi-mode codec to the changing conditions of radio transmission in a CDMA mobile radio network.

(0002) Mobile radio networks code voice signals differently than public switching telephone networks. Voice coding, such as that in use between the mobile station (MS) and the Radio Access Network (RAN), takes into account – in distinction from voice coding in public switching telephone networks – particularly the propagation properties of the radio link. For conversations between mobile stations in the same mobile network, a conversion to different voice coding (transcoding) is not absolutely required, whereas this is required for conversations between users of a mobile station and a telephone in a public switching telephone network. Conversations between mobile stations without conversion to different voice coding are termed transcoder-free.

(0003) The propagation conditions of a radio transmission segment vary continuously. This derives from modifications of the propagation conditions on the one hand and from interference on the other hand. Both the propagation conditions and interference can vary quickly in the course of an existing transmission. Users within the same network or in other radio systems are responsible for interference. Depending on the propagation conditions at hand, modifications to the source code may be required.

(0004) The following methods may be used in a CDMA system to maintain as much as possible of the quality of the connection under varying conditions in the radio transmission segment:

- Adaption of the gross bit rate
- Adaption of the transmission power
- Adaption of the codec operation method: i.e. change to a more robust codec operation method in worsening transmission conditions.

(0005) A more robust codec operation method is understood as a reduced net bit rate (bit rate of voice coding) and thus increased channel coding. Codec is understood to be a function where voice signals are coded for transmission by the transmitter and the received voice signals are decoded by the receiver.

(0006) The described methods are used in combination.

(0007) Previously, the adaption was done separately for each transmission interface. For a transmission from a mobile station to a mobile station, the coding of the voice signal was adjusted by each transmission interface independently of each other. The voice signal was always transcoded for transfer into the fixed wire network. This double conversion provides for independence of the adaption in the transmission interfaces involved.

(0008) It is the intent of the present invention to specify a method for the adaption of the mode of operation of a multi-mode codec to changing transmission conditions in a CDMA mobile transmission network, which automatically adapts the codec operation method during a communication connection and thus allows for the most efficient transmission of voice signals in the mobile transmission network and between the mobile transmission network and the public switching telephone network.

(0009) This task is solved by the characteristics of the independent patent claim.

(0010) The invention is based on the coordination between both transmission interfaces involved in a connection. The core of the invention is the specification of a method, which describes how this coordination may be handled during a live communication connection and how the present or future adjustment is transmitted between the two units involved.

(0011) This achieves an automatic optimization of the codec mode to the current transmission conditions in the radio transmission segment between mobile stations and base stations in an efficient way. This will raise the interference resistance and transmission quality in the mobile network markedly and will contribute to optimal use of network resources, such as economy of frequency use, needed transmission power etc.

(0012) Advantageous further developments and embodiments of the invention are listed in the subservient patent claims.

(0013) The invention will be described more fully in the following by a sample embodiment with reference to several drawings. Additional characteristics and advantages of the invention can be derived from the drawings and their descriptions.

(0014) The drawings are:

(0015) Fig. 1: An example for a mobile transmission network with connections between two mobile stations without a transcoder and a connection between a mobile station and the public switching telephone network with a transcoder;

(0016) Fig. 2: A representation of the transmission of voice information on all segments between mobile stations and between a mobile station and the public switching telephone network;

(0017) Fig. 3: An example for a transmission framework with fields for inband-signaling;

(0018) Fig. 4: A representation of the transmission of voice information between mobile stations in the initial situation;

(0019) Fig. 5: A representation of signaling to change the codec operation mode; and

(0020) Fig. 6: A representation after modification of the codec operation mode in a segment, i.e. asymmetrical sending and receiving.

(0021) The initial assumption is for network architecture as shown in Fig. 1. The CDMA mobile communications network shown in Fig. 1 consists of two segments, namely Radio Access Network (RAN) 1 and the Core Network (CN) 2. RAN 1 includes the node types Radio Network Controller (RNC) 3, also designated as control of the base station, and Node-B 4, also labeled base station. In instances of soft handover, two or more Node-B 4 units are involved in the transmission connection. CN 2 includes the node type U-MSC 5, also labeled U-Mobile Services Switching Center. There is a radio transmission segment or air interface between a mobile station (MS) 6 and RAN 1. CN 2 is connected to the public switching telephone network 8 (ISDN, PSTN). The described embodiment is based on the following assumptions:

- (0022) A Multi-Mode Codec (MMC) is implemented in all mobile stations 6, i.e. voice coding in various forms with varying coding parameters are possible. Each codec operating form has a specified parameter set in multi-mode codecs. The various potential operating modes of a MMC serve for the adaptation of voice coding to the conditions in the radio transmission segment.

- (0023) A transcoder 7 is in position in CN 1; it serves to convert the respective voice coding between mobile network 1, 2 and the public switching telephone network 8.
- (0024) The connection 10 between mobile stations does not include a transcoder, i.e. it operates without a voice code conversion in the connection between the two mobile stations 6a, 6b. This requires that the two mobile stations 6a, 6b will always use the same codec operating mode for a connection in a duplex direction.

(0025) The method of adaption of codec operating mode according to the invention for the mobile transmission network shown in Fig. 1 is described below; it is based on the following assumptions:

- (0026) Inband signaling is used in a connection between RNC 3a, 3b or between RNC 3 and transcoder 7, i.e. load and signal information are transmitted on the same channel.
- (0027) Differing codec operating modes may be used simultaneously in both duplex directions, i.e. the codec operating mode for MS 6a to MS 6b (the first MS transmits, the second MS receives) may differ from the codec operating mode for MS 6b to MS 6a (the second MS transmits, the first MS receives).
- (0028) Outband signaling is used within RAN 1 to modify the codec operating mode.
- (0029) RNC 3 decides whether to change codec operating modes.
- (0030) RNC 3 decides on the physical transmission channel, when the codec operating mode is changed, i.e. RNC 3 determines the parameters of channel coding, the gross bit rate, and the transmission power for the new codec operating mode.

(0031) The following discussion assumes that the number of available codec operating modes is N and that the operating mode n+1 is more robust than operating mode n. L represents the maximum number of levels which may be skipped, if the transmission conditions have improved.

(0032) The voice data for a certain time period are transmitted in the mobile radio network in the sequential frame 12. According to Fig. 3, each frame 12 corresponds to the source-coded voice signal 13 and a prefix. The time period is described as the frame length and may amount to 20 ms, for example. The prefix

consists of two fields 14, 15. The first field 14 is identified as Codec Mode Identification (CMI). CMI specifies which codec operating mode is used for this voice frame 13.

(0033) The receiver undertakes a voice decoding according to the operating mode specified in CMI.

(0034) The second field 15 is designated as the Better Radio Condition Indication (BRI). BRI is used, when the transmission conditions have improved on the entire transmission route, i.e. on two radio transmission segments in the case of a MS to MS connection 10 and on a single radio transmission segment in the case of a connection between a MS and the public switching telephone network, and thus when a switch may be made to a less robust codec operating mode. If, for example, BRI has the value 0, the transmission conditions have not improved. If the value for BRI is changed to $BRI > 1$, then there has been an improvement in transmission conditions. The higher the value for BRI, the larger the improvement in transmission conditions.

(0035) Fig. 2 indicates how the voice information is transmitted on the various segments. It is assumed here for simplification that the connection involves only one Node-B 4 in each case.

(0036) The following rules apply to a change of the operating mode:

- A change to a more robust operating mode is carried out whenever the transmission conditions deteriorate on one of the two transmission segments.
- (0037) A change to a less robust operating mode is carried out whenever the transmission conditions improve on both transmission segments.

(0038) The following initial conditions prevail prior to a change to a different operating mode:

(0039) According to Fig. 4, there is a communication connection between a first MS 6a and a second MS 6b. Mobile stations 6a and 6b send and receive in the same codec operating mode, identified by the frame prefix 14a (CM1a). For the sake of simplicity, it is assumed here as well that only one Node-B is involved in the transmission for each mobile station.

(0040) Each of RNC 3a, 3b involved in the communication receives constantly measurement reports from its associated Node-B 6a or 6b involved in the communication. For example, if RNC 3a connected to MS 6a notes that the transmission conditions in the air interface between Node-B 4a and MS 6a are deteriorating, then a change in codec operating modes is necessary.

(0041) RNC 3a instructs MS 6a via the signaling channel (outband signaling) to use a different operating mode, such as n+1, and also specifies the time of switch-over. This is done via the signaling channel. The time is specified by means of the frame identification. This identification is exchanged between RNC 3a and MS 6a to assure mutual synchronization.

(0042) Because MS 6a needs to synchronize with each of Node-B 4a, 4a.1, 4a.2 involved in the connection, each transmission interface between MS 6a and the respective Node-B 4a, 4a.1, 4a.2 uses different frame identification for frame 12, which contains the same information, as shown in Fig. 5. MS 6a transmits in the new operating mode n+1, noted by the prefix 14b (CM1b), from the specified point in time.

(0043) RNC 3a receives voice signals in the modified operating mode n+1 from MS 6a and relays these to RNC 3b. In addition, the new CMI 14b, now corresponding to CM1b, is transmitted or signaled in the load channel, i.e. inband. RNC 3a receives voice signals in unchanged operating mode n, corresponding to CMIa 14a from RNC 3b, as shown in Fig. 6.

(0044) RNC 3b receives voice frame 13 in the new operating mode n+1 and determines CMI, in this case CM1b. RNC 3b determines, on the basis of the transmission conditions in its area, the physical channel (transmission channel), the channel coding, the gross bit rate, and the transmission power for the new codec operating mode n+1 and communicates this to all involved Node-B 4b. At the same time, RNC 3b copies the voice frame 12 and transmits it to all involved Node-B 4b.

(0045) MS 6b receives the voice frame 12 in modified operating mode n+1 and carries out the voice decoding according to CM1b. Node-B 4b (or all Node-Bs) communicates the channel coding to MS 6b for each physical control channel, where MS 6b decodes the channel correspondingly.

(0046) MS 6b immediately begins to transmit in the new operating mode as specified by CM1b.

(0047) This achieves the target situation, in which MS 6a and MS 6b transmit and receive in the new operating mode n+1.

(0048) As long as transmission conditions do not improve in RNC 3a or 3b, all voice frames are set to the value BRI=0. The current codec operating mode stays in effect.

(0049) As soon as RNC 3a or 3b note that the transmission conditions have improved and that a change from the current codec operating mode n to n-1 would be

possible as far as it is concerned, it communicates this to the associated MS 6a or 6b. MS 6a or 6b then sends a value of $BRI > 0$, such as $BRI = 1$, in its voice frame. However, both transmission segments continue to use the current codec operating mode n .

(0050) When RNC 3a or 3b receives a voice frame with $BRI = I1 > 0$ and sends a voice frame $BRI = I2 > 0$, it initiates a change of the codec operating mode from n to $n-I$, where I is the lesser value of $I1$ and $I2$. Thus, the preferred choice will always be the codec operating mode corresponding to the transmission conditions on the worst segment.

(0051) The method of the subsequent modification of the codec operating mode is identical to the algorithm described above.

(0052) The adaption of the codec operating mode for a connection between a MS and the public switching telephone network represents a special case of the specified procedure. It involves a change of codec operating mode in RNC 3 on the one hand and in transcoder 7 on the other hand.

(0053) In this case, BRI will always have the maximum value L for the voice frame sent by the transcoder, i.e. for the connection in the downlink or the direction terminating in the MS. This means that the codec operating mode used for the connection to the public switching telephone network (via the transcoder) is irrelevant. The codec operating mode is determined solely by the transmission segment to/from the mobile station.

Legend of Figures and List of Abbreviations

1	RAC
2	CN
3, 3a, 3b	RNC
4, 4a, 4b	Node-B
5, 5a, 5b	U-MSC
6, 6a, 6b	MS
7	Transcoder
8	Public Switching Telephone Network
9	User of Public Switching Telephone Network
10	Connection MS to MS
11	Connection MS to Public Switching Telephone Network
12, 12a, 12b	Transmission Frame
13	Voice Frame
14, 14a, 14b	Prefix CMI
15	Prefix BRI

[remainder of page shows German-English glossary, not reproduced here, except for:]

TE1	Use unit
-----	----------

Patent Claims

1. Procedure to adapt the operating mode of a multi-mode codec to changing transmission conditions in a CDMA mobile transmission network, characterized by having an automatic initiation of a change of codec operating mode whenever the quality of transmission for a unit involved in a transmission is modified, where information about the present or future change in codec operating mode is exchanged among the other participants in the communication process.

2. Procedure according to Claim 1, characterized by having a change to a more robust codec operating mode whenever the transmission conditions on any transmission segment involved in the process deteriorate.

3. Procedure according to Claim 1, characterized by having a change to a less robust codec operating mode whenever the transmission conditions on all transmission segments involved in the process improve.

4. Procedure according to one of Claims 1 to 3, characterized by having the decision to change the codec operating mode originate in the radio network controller RNC (3) of the mobile transmission network.

5. Procedure according to one of Claims 1 to 4, characterized by having the radio network controller RNC (3) select the physical transmission channel to be used when there is a change of the codec operating mode.

6. Procedure according to one of Claims 1 to 5, characterized by having the radio network controller RNC (3) continuously receive and evaluate measurement reports regarding the quality of the connection on the transmission segments from all associated base stations Node-Bs (4) in order to use the measurement values in the decision to change codec operating modes.

7. Procedure according to one of Claims 1 to 6, characterized by having outband signaling within the radio network controller RAN [sic] (3) regarding a change in codec operating mode.

8. Procedure according to one of Claims 1 to 7, characterized by having inband signaling among the radio network controllers RNC (3) involved or between the radio network controller RNC (3) and a transcoder (7) to exchange information on the codec operating mode being used.

9. Procedure according to one of Claims 1 to 8, characterized by having the inband signaling use specific fields of the transmission frame (12), where a first field

CMI (14) specifies which codec operating mode is used for this transmission frame (12) and where a second field BRI (15) identifies a change in the transmission conditions along the entire transmission path.

10. Procedure according to one of Claims 1 to 9, characterized by allowing differing codec operating modes to be in place simultaneously in a connection with two duplex directions.

11. Procedure according to one of Claims 1 to 10, characterized by having the radio network controller RNC (3) instruct the mobile station MS (6) via the signaling channel to use a different codec operating mode and to specify the time of change.

12. Procedure according to one of Claims 1 to 11, characterized by specifying the time of change by means of the frame identification.

13. Procedure according to one of Claims 1 to 12, characterized by having the mobile station MS (6) transmit in the new operating mode from the specified point in time.

14. Procedure according to one of Claims 1 to 13, characterized by having the radio network controller RNC (3) receive transmission frames (12) with voice signals in the new codec operating mode from the mobile station MS (6), which the radio network controller RNC (3) transmits to other radio network controllers RNC (3) involved in the transmission.

[pages 1/3, 2/3 and 3/3 of charts involve no text, except:]

codierte Sprache

= coded voice

Quellencodierte Sprachrahmen

= source-coded voice frame

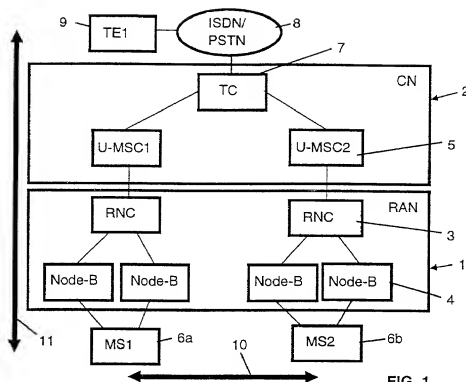


FIG. 1

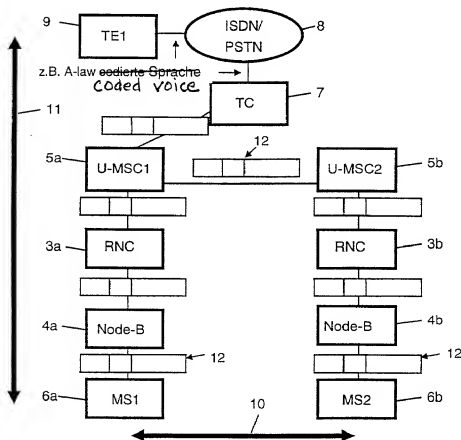


FIG. 2

99/936273

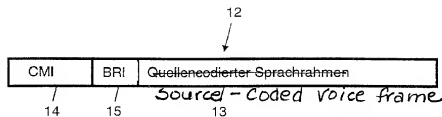


FIG. 3

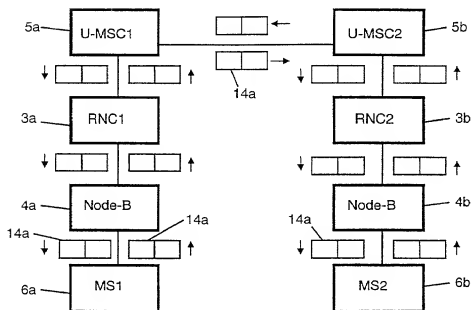


FIG. 4

09/936273

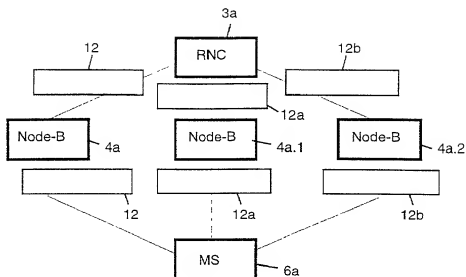


FIG. 5

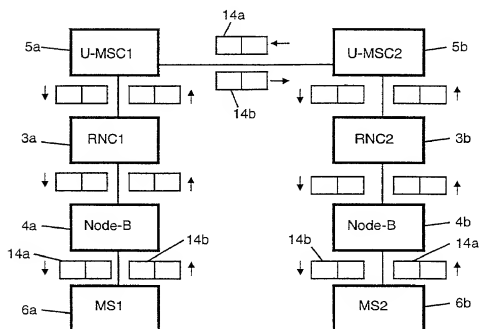


FIG. 6

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Declaration and Power of Attorney for Patent Application

Erklärung für Patentanmeldungen mit Vollmacht

German Language Declaration

Als nachstehend benannter Erfinder erkläre ich hiermit an Eides Statt:

daß mein Wohnsitz, meine Postanschrift und meine Staatsangehörigkeit den im nachstehenden nach meinem Namen aufgeführten Angaben entsprechen, daß ich nach bestem Wissen der ursprüngliche, erste und alleinige Erfinder (falls nachstehend nur ein Name angegeben ist) oder ein ursprünglicher, erster und Miterfinder (falls nachstehend mehrere Namen aufgeführt sind) des Gegenstandes bin, für den dieser Antrag gestellt wird und für den ein Patent für die Erfindung mit folgendem Titel beantragt wird:

deren Beschreibung hier beigefügt ist, es sei denn (in diesem Falle Zutreffendes bitte ankreuzen), diese Erfindung

☐ wurde angemeldet am _____
unter der US-Anmeldenummer oder unter der
Internationalen Anmeldenummer im Rahmen des
Vertrags über die Zusammenarbeit auf dem Gebiet des
Patentwesens (PCT) _____ und am
_____ abgeändert (falls
zutreffend).

Ich bestätige hiermit, daß ich den Inhalt der oben angegebenen Patentanmeldung, einschließlich der Ansprüche, die eventuell durch einen oben erwähnten Zusatzantrag abgeändert wurde, durchgesehen und verstanden habe.

Ich erkenne meine Pflicht zur Offenbarung jeglicher Informationen an, die zur Prüfung der Patentfähigkeit in Einklang mit Titel 37, Code of Federal Regulations, § 1.56 von Belang sind.

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

METHOD FOR ADAPTING THE MODE OF OPERATION OF A
MULTI-MODE CODE TO THE CHANGING CONDITIONS OF
RADIO TRANSFER IN A CDMA MOBILE RADIO NETWORK

the specification of which is attached hereto unless the following box is checked:

☒ was filed on March 13, 2000
as United States Application Number or PCT
International Application Number PCT/DE00/00751
and was amended on _____
(if applicable).

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, § 1.56.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

German Language Declaration

Ich beanspruche hiermit ausländische Prioritätsvorteile gemäß Title 35, US-Code, § 119 (a)-(d), bzw. § 365(b) aller unten aufgeführten Auslandsanmeldungen für Patente oder Erfindurerkunden, oder §365(a) aller PCT internationalen Anmeldungen, welche wenigstens ein Land ausser den Vereinigten Staaten von Amerika benennen, und habe nachstehend durch ankreuzen sämtliche Auslandsanmeldungen für Patente bzw. Erfindurerkunden oder PCT internationale Anmeldungen angegeben, deren Anmeldetag dem der Anmeldung, für welche Priorität beansprucht wird, vorangeht.

Prior Foreign Applications
(Frühere ausländische Anmeldungen)

<u>199 11 179.0</u>	<u>Germany</u>
(Number)	(Country)
(Nummer)	(Land)
<u> </u>	<u> </u>
(Number)	(Country)
(Nummer)	(Land)

Ich beanspruche hiermit Prioritätsvorteile unter Title 35, US-Code, § 119(e) aller US-Hilfsanmeldungen wie unten aufgezeigt.

<u> </u>	<u> </u>
(Application No.)	(Filing Date)
(Aktenzeichen)	(Anmeldetag)
<u> </u>	<u> </u>
(Application No.)	(Filing Date)
(Aktenzeichen)	(Anmeldetag)

Ich beanspruche hiermit die mir unter Title 35, US-Code, § 120 zustehenden Vorteile aller unten aufgeführten US-Patentanmeldungen bzw. § 365(c) aller PCT internationalen Anmeldungen, welche die Vereinigten Staaten von Amerika benennen, und erkenne, insofern der Gegenstand eines jeden früheren Anspruchs dieser Patentanmeldung nicht in einer US-Patentanmeldung, bzw. PCT internationalen Anmeldung in einer gemäß dem ersten Absatz von Title 35, US-Code, § 112 vorgeschriebenen Art und Weise offenbart wurde, meine Pflicht zur Offenbarung jeglicher Informationen an, die zur Prüfung der Patentfähigkeit in Einklang mit Title 37, Code of Federal Regulations, § 1.56 von Belang sind und die im Zeitraum zwischen dem Anmeldetag der früheren Patentanmeldung und dem nationalen oder im Rahmen des Vertrags über die Zusammenarbeit auf dem Gebiet des Patentwesens (PCT) gültigen internationalen Anmeldetags bekannt geworden sind.

<u>DE00/00751</u>	<u>13 March 2000</u>
(Application No.)	(Filing Date)
(Aktenzeichen)	(Anmeldetag)
<u> </u>	<u> </u>
(Application No.)	(Filing Date)
(Aktenzeichen)	(Anmeldetag)

Ich erkläre hiermit, daß alle in der vorliegenden Erklärung von mir gemachten Angaben nach bestem Wissen und Gewissen der Wahrheit entsprechen, und ferner daß ich diese eidesstattliche Erklärung in Kenntnis dessen ablege, daß wissenschaftlich und vorsätzlich falsche Angaben oder dergleichen gemäß § 1001, Title 18 des US-Code strafbar sind und mit Geldstrafe und/oder Gefängnis bestraft werden können und daß derartige wissenschaftlich und vorsätzlich falsche Angaben die Rechtswirksamkeit der vorliegenden Patentanmeldung oder eines aufgrund deren erteilten Patentes geführten können.

I hereby claim foreign priority under Title 35, United States Code, §119(a)-(d) or § 365(b) of any foreign application(s) for patent or inventor's certificate, or § 365(a) of any PCT International application which designated at least one country other than the United States, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate, or PCT International application having a filing date before that of the application on which priority is claimed.

Priority Not Claimed
~~Priorität nicht beansprucht~~

<u>12 March 1999</u>	<input type="checkbox"/>
(Day/Month/Year Filed)	
(Tag/Monat/Jahr der Anmeldung)	
<u> </u>	<input type="checkbox"/>
(Day/Month/Year Filed)	
(Tag/Monat/Jahr der Anmeldung)	

I hereby claim the benefit under Title 35, United States Code, § 119(c) of any United States provisional application(s) listed below.

I hereby claim the benefit under Title 35, United States Code, § 120 of any United States application(s), or § 365(c) of any PCT International application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of Title 35, United States Code, § 112, I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, § 1.56 which became available between the filing date of the prior application and the national or PCT International filing date of this application.

<u>Published</u>	<input type="checkbox"/>
(Status) (patented, pending, abandoned)	
(Status) (patentiert, schwebend, aufgegeben)	
<u> </u>	<input type="checkbox"/>
(Status) (patented, pending, abandoned)	
(Status) (patentiert, schwebend, aufgegeben)	

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

German Language Declaration

VERTRETUNGSVOLMACHT: Als benannter Erfinder beauftrage ich hiermit den (die) nachstehend aufgeführten Patentanwalt (Patentanwälte) und/oder Vertreter mit der Verfolgung der vorliegenden Patentanmeldung sowie mit der Abwicklung aller damit verbundenen Angelegenheiten vor dem US-Patent- und Markenamt: (Name(n) und Registrationsnummer(n) auflisten)

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith: (list name and registration number)

John F. Hoffman, Regis. No. 26,280; Anthony Niewyk, Regis. No. 24,871; Michael D. Smith, Regis. No. 40,181; Michael S. Gzybowski, Regis. No. 32,816; Michael D. Schwartz, Regis. No. 44,326; Adam F. Cox, Regis. No. 46,644; Abigail M. Butler, Regis. No. P-48,238; Thomas A. Adams, Regis. No. P-48,230; and Kimberly J. Paulus, Regis. No. 48,358; all of BAKER & DANIELS, 111 East Wayne Street, Suite 800, Fort Wayne, Indiana 46802, all of BAKER & DANIELS, 111 East Wayne Street, Suite 800, Fort Wayne, IN 46802

Postanschrift: _____

Send Correspondence to: _____

Telefonische Auskünfte: (Name und Telefonnummer) _____

John F. Hoffman _____

Direct Telephone Calls to: (name and telephone number) _____

John F. Hoffman _____

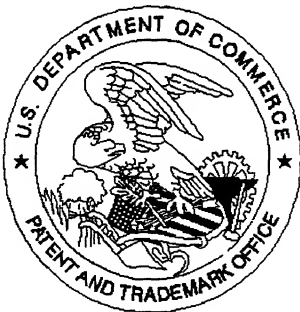
(219) 424-8000 _____

Vor- und Zuname des einzigen oder ersten Erfinders	Full name of sole or first inventor	1-00
Unterschrift des Erfinders	Signature of inventor	Date 18.10.01
Datum		
Wohnsitz	Residence	
Staatsangehörigkeit	Bonn, Germany	
Postanschrift	Citizenship	
	Germany	
	Post Office Address	
	Klufferstrasse 8	
	D-53175 Bonn,	
	Germany	
Vor- und Zuname des zweiten Miterfinders (falls zutreffend)	Full name of second joint inventor, if any	2-00
Unterschrift des zweiten Erfinders	Signature of second inventor	Date 18.10.01
Datum		
Wohnsitz	Residence	
Staatsangehörigkeit	Bonn, Germany	
	Citizenship	
	Germany	
Postanschrift	Post Office Address	
	Rilkestrasse 83	
	D-53225 Bonn,	
	Germany	

(Im Falle dritter und weiterer Miterfinder Miterfinder sind die entsprechenden Informationen und Unterschriften hinzuzufügen.)

(Supply similar information and signature for third and subsequent joint inventors.)

United States Patent & Trademark Office
Office of Initial Patent Examination -- Scanning Division



Application deficiencies found during scanning:

☐ Page(s) _____ of _____ were not present
for scanning. (Document title)

☐ Page(s) _____ of _____ were not present
for scanning. (Document title)

Specification starts from page 2.

☐ *Scanned copy is best available.*

09936273.110901